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ON AXIAL ABSCISSION IN IMPATIENS SULTANI AS THE RESULT OF TRAUMATIC STIMULI

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A considerable part of the very extensive literature of abscission pertains to the normal separation of the leaf from its axis, or of the leaflets of a compound leaf from their common petiole upon the approach of winter. Fifty years ago, however, von Mohl[1] beginning with the observation that the leaves of plants which are put into the press for the herbarium sometimes separate from the stems, gave a most interesting account of some of the factors involved. Since then there has been a great series of scattered observations pertaining to normal and abnormal leaf fall. Recently, we have had the detailed experimental study of the fall of the corolla by Fitting.[2] Quite dissimilar to the above studies but of some interest in the present connection are the observations which have been published here and there on the self pruning of trees.

Our purpose in this note is to call attention to abscission of the axis in *Impatiens Sultani*. This particular type of phenomenon we have never found described in the literature, but it may have been several times mentioned incidentally under titles which gave no clue to this part of their content, and which have escaped our notice because they are aside from our usual lines of work. We are fairly confident, however, that it has not been described in the *Sultani*.

Impatiens Sultani,[3] like so many other species of this genus, has very watery, translucent stems, which take root readily, either when accidentally coming in contact with the soil or when cuttings are made.[4]

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[1] Mohl, H. von. Bot. Zeit. **18**: 1–7, 9–17, 132–133, 273–277. 1860.

[2] Fitting, H. Jahrb. Wiss. Bot. **49**: 187–263. 1911.

[3] For Hooker's original description see Curtis's Bot. Mag. *pl. 6643*. For other figures see: Garden, **22**: 208–209. *pl. 352*. 1882; Illustration Horticole, **30**: 93–94. *pl. 488*. 1883.

[4] The original plants were grown from seeds accidently secured in the soil in which other plants were packed for shipment. As far as we are aware it has not produced seeds under cultivation, but has been propagated since that time by cuttings.

Apparently, the plant comes from the more shaded African rain forests,[5] the specific name being in honor of the sultan of Zanzibar.

Beginning with the accidental observation that some time after cutting back the plants, segments of internodes were found upon the soil beneath, we have made a considerable series of careful observations, embracing several hundreds of operations. Summarily stated these lead to the following conclusions:

1. Young branches of *I. Sultani* which are severely injured by the attacks of greenhouse pests may be cut off from the main stem by a sharply marked abscission zone and fall from the plant. The same seems to be true of shoots which have been injured in some other manner. In some cases we have induced the abscission of a branch by passing an electric spark through the stem, but beyond a few preliminary experiments we have given little attention to this method.

2. When a large plant is removed from a shaded room and transplanted out of doors, abscission of a number of the smaller branches almost invariably occurs. The same is true if a large cutting is made and planted, without previous trimming, in a well-lighted spot.

3. If an internode be cut across at almost any point between the nodes, the portion of that internode which remains will in the course of a few days fall from the plant. This is brought about by the formation of an abscission zone immediately above the axillary bud of the leaf of the preceding node. After the section of internode has fallen the surface left is generally very smooth—almost as smooth as a knife cut. Usually the cut is diagonal in direction, rather than transverse, beginning immediately above the axillary bud and extending downward and across the stem, so that a maximum amount of stem tissue is removed without injury to the bud.

4. If the operation be made very close to the subtending node abscission may apparently in rare cases not occur, the cut surface simply drying up. It is always difficult, however, to be sure that there has not been formed a separation zone which removed only a thin layer of cells on the cut surface. This is undoubtedly what occurs in many instances.

5. Almost invariably the abscission occurs above the first (most nearly terminal) node below the cut, but occasionally it may take

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[5] Engler. Sitzungsber. Kgl. Akad. Wiss. Berlin **16**: 191–211. 1900; Just's Jahresber. **28**^{1}: 389. Among the plants investigated by Burgerstein *I. Sultani, Ipomoea purpurea,* and *Tropaeolum Lobbianum* were the only species which flowered well in the shade.

place below this, but always above one of the more proximal nodes, never in the more median or distal regions of the internode.[6]

In some cases abscission above a node more proximal than the one immediately below the cut seems to follow an operation in which the internode was cut off very close indeed to the node, but this may also follow the sectioning of the internode at any point. When the whole of the internode below the one which was injured is cut off by an abscission zone, the axillary bud of the distal node is almost always, but not invariably, abortive. Whether this is the cause of, or the consequence of, the more proximal abscission than is normal we cannot assert.

6. After a first abscission above the subtending node another may later occur above some lower node. Possibly in this case the bud of the subtending node becomes abortive after the first abscission, but we can make no final statement on this point.

7. The separation of the segments of internode or internodes seems to be brought about by the disorganization of the tissues in a (generally) definite zone across the axis. Whether the cell walls are themselves broken down, or whether the cells are only separated, we have not been able to determine with certainty. The evidence furnished by the few microtome sections which we have made seems to favor the first hypothesis. When the section of internode falls the two surfaces are moist but usually very firm and smooth. Occasionally, however, the region in which the tissue is disorganized is more extensive and more irregular. In rare instances a considerable portion of an internode becomes soft and pulpy, the epidermis only remaining firm; possibly this is due to bacterial infection rather than to the processes by which the formation of the abscission zone is normally brought about.

8. In a number of experiments with our common native form, *I. fulva*, the cut end of the twig simply dried up. Abscission of the axis was never observed.

9. Any information concerning other species of plants in which similar phenomena occur will be very welcome, since we hope later to treat the subject more comprehensively.

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[6] We have seen one apparent exception to this rule, but the internode was in this case very short.